

Proposal #: 23AKR610-017

Project Title: Increasing Penetration of Wild Alaska Pollock on Restaurant Menus Outside of Quick Service Restaurants (QSRs) to Build Further Demand for Wild Alaska Pollock

Applicant: Association of Genuine Alaska Pollock Producers

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Craig Morris, Association of Genuine Alaska Pollock Producers, craig.morris@alaskapollock.org

Amount: \$300,000

Abstract: Wild Alaska Pollock is widely known in the restaurant sector for the infamous Filet-o-Fish sandwich. This sandwich has given rise to many other Quick-Service-Restaurants (QSRs) including their version of the fish sandwich on the menu, mostly as limited time offerings, especially during the Lenten season. While the industry is grateful for this business and the partnerships in the QSR sector, we believe that there is unrecognized opportunity for the affordable, sustainable whitefish, Alaska Pollock, outside of the QSR sector in higher-end restaurants and other venues. That said, many chefs and restaurateurs are unfamiliar with Alaska Pollock. For the past three years, the Association of Genuine Alaska Pollock Producers (GAPP) has hosted “Restaurant Weeks” in major markets across the U.S. wherein Alaska Pollock products were given to chefs gratis to experiment with. These events proved incredibly valuable in introducing chefs to Alaska Pollock and its attributes. In Seattle, Nashville and Chicago, following the restaurant weeks, more than sixty percent of restaurants maintained at least one dish featuring Alaska Pollock. Building on the success of these restaurant week programs, we have identified a partner who can help bring Alaska Pollock to venues nationwide, inspiring chef trial at a much larger scale.

Summary of potential commercial benefits to the fishing community of the research results:

Identifying new opportunities for fillet in channels beyond Quick-Service Restaurants will allow for the sustained growth and development of the Alaska Pollock industry, thereby improving revenues and profits throughout the entire supply chain, including the fishing communities. The value that is derived from the harvest, process and sale of Alaska Pollock products has a direct impact on six Community Development Quota (CDQ) groups that directly support the indigenous populations in Alaska. Increasing the opportunities for Alaska Pollock will significantly add value to the fishery and the communities it supports.

Proposal #: 23AKR608-018

Project Title: Developing a Global Market for Alaska’s Magister Squid

Applicant: United Anglers of Alaska, a 501c3 Non-Profit Organization

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Richard Yamada, richard@alaskareel.com

Amount: \$230,000

Abstract: A large population of squid (*Beryteuthis Magister*) in the inside waters of Southeast Alaska may have gone unnoticed by fishery managers as data on squid are normally collected through commercial trawl fisheries, which do not exist in these waters due to the nature of the bottom terrain. However, regular encounters with Magister squid by the recreational fishery indicate an abundant presence of this species in the area. This may be the result of recent climate change events in Alaska such as warming ocean waters, increased levels of dissolved carbon dioxide, and ocean acidification that favor squid habitat. There are no commercial squid fisheries in Alaska and no commercial fishery for Magister squid in North America. This project seeks to increase the resiliency of Alaska's coastal fisheries to climate change. The project would investigate the potential market for Magister squid nationally and internationally with the intention of opening a new squid fishery in Alaska that would address biological and economic impacts of a changing ecosystem.

Summary of potential commercial benefits to the fishing community of the research results:

Halibut quotas in Southeast Alaska are in decline and King salmon in the inside waters have been closed due to low escapement returns. With the warming of ocean waters, it is hypothesized that Magister squid, a voracious predator, may have migrated to the inside waters of Southeast Alaska and are contributing to the decline of at-sea-survival of juvenile salmon, impacting both the commercial and recreational fishery. With the development of a new squid fishery, not only would a potential predator population come under managed control, but local commercial fishers with an uncertain fishery portfolio will have another species to supplement their income with.

Proposal #: 23GAR215-046

Project Title: Sustainable Seaweed Farming: Producing Reliable, Timely and Cost-Effective Kelp Seed while Reducing Reliance and Impacts on Wild Populations

Applicant: Woods Hole Oceanographic Institution

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Scott Lindell (slindell@whoi.edu); (co-PI) Thew Suskiewicz, Atlantic Sea Farms (tsuskiewicz@oceanapproved.com)

Amount: \$299,999

Abstract: Commercial and societal interest in seaweed farming is at an all-time high in the US, and globally. Global production (\$15B/yr) has doubled in the last 10 years, and kelp production in Maine and Alaska has doubled every other year for the past decade (Piconi et al. 2020,

McKinley Group 2021). However, the kelp market in Asia vs. the US is starkly different; low-priced commodity vs. high-end specialty food, respectively. Kelp farming in the US has rapidly expanded due to demand for novel, sustainable food products. But in order for US kelp farms to sustain this growth and stay competitive, the cost of production must be dramatically decreased. Nursery seed is the first and single most expensive operating cost (25 to 40% of sale price) in the kelp supply chain and this proposal offers a way to considerably reduce that. Our project responds to S-K Priority #2 by directly impacting fishers/farmers by creating long-term kelp seedstock security, lower cost seed, and by protecting wild kelp beds from over-harvesting. We will also advance the development of optimally diverse kelp strains that are climate-adapted for cultivation in different locales.

Summary of potential commercial benefits to the fishing community of the research results

Several dozen fishermen and women (particularly lobster-fishers in Maine) depend on kelp farming for some or most of their income. Kelp farming is an important economic diversification opportunity for working waterfronts because many traditional fisheries have decline and are restricted. The proposed project will lower the cost of kelp seed and develop more productive strains such that the industry will be able to support new entrants, and serve new markets beyond the current focus on specialty foods such as animal feeds or other bio-products at greater scale.

Proposal #: 23GAR224-004

Project Title: Toward resolving wild sea scallop (*P. magellanicus*) larval spatial and temporal distribution along the Maine coast in support of developing scallop aquaculture

Applicant: Maine Center for Coastal Fisheries

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Carla Guenther, Chief Scientist 207.367.2708, cguenther@coastalfisheries.org; (co-PI's) Phoebe Jekielek (phoebe@hurricaneisland.net), Lead Scientist at the Hurricane Island Center for Science and Leadership; Caitlin Cleaver (ccleaver@bates.edu), Director of Bates-Morse Mountain Recreation Area

Amount: \$290,762

Abstract: Maine's productive state-managed wild sea scallop fishery demands one of the highest state average prices per meat pound (\$15.65/lb in 2021) and provides a winter income to approximately 300 fishermen. The sustainability of wild capture fisheries can be uncertain and entry is only possible via an annual lottery, driving an increase in aquaculture lease applications including sea scallops. With a lack of hatchery production for scallop seed, scallop aquaculturists catch newly settled spat from the wild population, creating the potential for

conflict between wild and cultured industries. Larval dynamics are not well understood and, anecdotally, are characterized by high interannual variability in distribution and abundance. Understanding patterns of larval abundance, distribution, and delivery over space and time is central to the success of the wild harvest industry and can inform seed procurement in the developing scallop aquaculture industry. Determining patterns of larval abundance and distribution requires expertise from fishermen, farmers, oceanographers, marine ecologists, and resource managers. To this end, we propose a community based collaborative approach to collect scallop spat across the coast toward gaining a more complete understanding of larval supply and distribution for resolving potential conflict and informing integrated resource management at state and federal levels.

Summary of potential commercial benefits to the fishing community of the research results:

Scallop harvesters and growers identified this project as necessary to reduce conflict in developing scallop aquaculture alongside a sustainably managed wild scallop fishery. Engaging commercial scallop farmers and harvesters in the research process, with an experimental design that is co-developed by all partners, provides a foundation for the co-production of knowledge to be gained by managers, scientists, fishermen, and farmers. By conducting industry-informed research and deepening our understanding of biological processes of important shellfish species, we can better understand how to manage, grow, and support both scallop industries to maximize economic benefits to coastal communities and economies.

Proposal #: 23GAR236-025

Project Title: Understanding pathogen dynamics in shellfish nurseries as a basis for expanding the Regional Shellfish Seed Biosecurity Program to nursery settings

Applicant: Virginia Institute of Marine Science, William & Mary

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Ryan B. Carnegie, PhD, Research Professor, carnegie@vims.edu
Phone: 804-684-7713; (co-PI) Dr. David Bushek, Professor and Director, Haskin Shellfish Research Laboratory, Rutgers University, bushek@hsrl.rutgers.edu

Amount: \$297,216

Abstract: Overcoming impacts caused by diseases is essential to sustainability of US shellfish aquaculture. Along the US East and Gulf of Mexico coasts, this largely means managing endemic diseases effectively, like the ubiquitous disease cause by *Perkinsus marinus* in oysters. We must create effective strategies for maintaining high biosecurity in the industry, but without creating such extensive regulatory impediments that interstate aquaculture transfers are driven to surreptitious channels that could *increase* disease risks to the industry. To address this

challenge we have led the creation of a Regional Shellfish Seed Biosecurity Program, one pillar of which is a Hatchery Compliance Program to streamline regulation of, and incentivize commerce in, small hatchery seed, the shellfish product most likely to be disease free and thus safest to transfer. There is great commercial interest in seeing this program expand to nursery systems, but better science on the disease acquisition of small shellfish once moved from hatcheries onto raw natural water in nurseries is needed to underpin the biosecurity of such an expansion. Our focus will be to determine infection profiles in oyster seed progressing through nursery systems, and establish recommendations for management of nursery health along with a new Nursery Compliance Program.

Summary of potential commercial benefits to the fishing community of the research results:

The immediate commercial benefits of this project lie in a reduced burden on industry to have every batch of nursery seed proposed for interstate transfer tested for diseases at the cost of time and financial expense. Expanding the best management practices of our Hatchery Compliance Program to a complementary Nursery Compliance Program would improve surveillance with regard to potentially emerging diseases to allow early intervention in the event of an emergence, mitigating damaging economic effects. Providing a clear set of best management practices facilitates compliance which reduces the likelihood of unregulated transfers that bring risks to the broader industry.

Proposal # 23GAR226-070

Project Title: Diversifying Northern New England's Seaweed Industry by Integrating Nori into Sugar Kelp Farming Equipment and Practices

Applicant: Cold Current Kelp LLC

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI's) Inga Potter, Ph.D. Co-Founder, Cold Current Kelp LLC, inga@coldcurrentkelp.com (207) 703-8620; Krista Rosen, Co-Founder, Cold Current Kelp LLC krista@coldcurrentkelp.com (207) 690-1873; (co-PI's) Michael Chambers, Ph.D., Associate Research Professor Aquaculture Specialist, NH Sea Grant, University of New Hampshire michael.chambers@unh.edu (603) 862-3394; Chris Neefus, Ph.D., Professor, Dept. of Biological Sciences, University of New Hampshire. chris.neefus@unh.edu (603) 862-1990

Amount: \$300,000

Abstract: Northern New England's nascent seaweed aquaculture industry is largely a monoculture of the brown algae *Saccharina latissima* (sugar kelp), grown on longlines. The annual springtime harvest occurs during a small window, leading to processing bottlenecks. Meanwhile, kelp farm gear sits unused from May through October. Species diversification provides an opportunity to further grow the industry. *Wildemanian amplissima* is a type of nori

native to Maine and New Hampshire waters suitable for longline cultivation. Nori is not considered kelp but refers to the red algae often used to make sushi rolls - a multi-billion-dollar industry in Asia. *Wildemaniamplissima* has not been commercially farmed in Northern New England due to lack of reliable hatchery seed and real-world data about ideal growing conditions. This project combines the resources of the University of New Hampshire with Cold Current Kelp LLC, a women-owned commercial kelp farm and processing company in southern Maine. The project will deploy hatchery-cultivated *Wildemaniamplissima* to show proof-of-concept ability to grow it on longlines, while investigating seasonality, depth and optimal growing conditions. Results will be shared with farmers, students, and other stakeholders. Successful longline cultivation of nori would mean crop and product diversification, efficient use of resources, risk mitigation, and increased income from a longer farming season.

Summary of potential commercial benefits to the fishing community of the research results:

The project will provide Northern New England kelp farmers with much-needed data about how a local species of nori (red algae *Wildemaniamplissima*) can be grown on unmodified kelp farming equipment in kelp's offseason. The fastest growing global seaweed snack market is North America, wherein nori is a leading ingredient, and is projected to reach \$3.36 billion by 2027. A successful nori farming industry would extend farmers' growing season, allow crop diversification, open new post-harvest markets, efficiently utilize farming equipment, and bolster New England's reputation for high-end seafood and seaweed. The first step is proof-of-concept longline farming with data collection and analysis.

Proposal #: 23GAR237-048

Project Title: Exploring mutually-beneficial production and marketing strategies for emerging wild and aquaculture quahog industries in Maine

Applicant: Manomet, Inc.

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Dr. Marissa McMahan, Director of Fisheries, mmcmahan@manomet.org; (Co-PIs) Dr. Kanae Tokunaga, Research Scientist, Gulf of Maine Research Institute, ktokunaga@gmri.org; Dr. Caitlin Cleaver, Director of Bates-Morse Mountain Conservation Area and Coastal Center, Bates College, ccleaver@bates.edu; Emily Farr, Senior Fisheries Program Manager, Manomet, efarr@manomet.org

Amount: \$300,000

Abstract: Wild and farmed northern quahogs (*Mercenaria mercenaria*) are an important fishery along the East Coast of the U.S., but are relatively new in Maine. Populations of wild quahogs are increasing in Maine as waters warm, and quahogs are emerging as a new aquaculture product in the state, providing an important economic opportunity for both wild and aquaculture sectors. Wild quahog stock enhancement is a key tool employed by municipal

shellfish programs in the state to support the growth of the wild fishery, but is limited by the availability of quahog seed in the sizes and amounts needed. The goal of this project is to develop mutually-beneficial strategies for shellfish farmers and wild harvesters through development of production methods and market opportunities for quahogs. To do this, we will determine the viability for shellfish farmers to grow a new product (quahogs) to diversify their operations and support municipal stock enhancement programs. We will also explore opportunities to develop high-value markets for wild and farmed quahogs in Maine. This will ultimately increase economic opportunities and support resilience in fishing communities, strengthening the local economy and regional seafood supply chain.

Summary of potential commercial benefits to the fishing community of the research results:

The creation of new fisheries and cultured species is a key strategy to buffer Maine's fishing communities from economic disruption and uncertainty from climate and regulatory change. Developing a sustained source of quahog seed for wild stock enhancement and a diversified product for shellfish farmers will ultimately support wild harvester and sea farmer livelihoods, strengthen coastal community resilience, and increase shellfish production in Maine. It would also help address the critical shellfish seed bottleneck due to limited hatchery supply. Identifying complementary market opportunities for wild and farmed quahogs would strengthen cooperation among the two sectors and promote collaborative marketing opportunities.

Proposal #: 23GAR207-041

Project Title: Exploring the creation of a new seafood market segment that would enhance the resiliency of small-scale commercial fishing industry in Rhode Island

Applicant: University of Rhode Island

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Hirotugu Uchida, Professor and Chair, Department of Environmental and Natural Resource Economics, University of Rhode Island, huchida@uri.edu, (401) 874-2238

Amount: \$299,954

Abstract: There is a certain high-quality seafood market segment that is left unexplored to date that could bring higher value to locally landed – and often regarded as underutilized – fish species. In this project, high quality refers to the proper handling of catch, including a traditional Japanese dispatch method known as ike jime, which preserves the maximum freshness and taste of a fish. The difference in taste that these methods make the most is when the fish is consumed raw (e.g., sushi, ceviche). RI lands many fish species that are suited for such consumption ranging from more expensive tuna, striped bass and summer flounder to affordable and locally abundant black sea bass, scup, bluefish, weakfish, tautog, etc., thus making RI an ideal setting for this project. However, ike jime technique is more labor intensive

than current dispatch methods, so ike jime may only be feasible for small(er)-scale fishers with gear types such as, but not limited to, rod-and-reel and traps. Through the training and education of ike jime method targeted at fishers, dealers, restaurant chefs, fishmongers, and consumers, the project investigates the economic feasibility of ike jime method, what are the obstacles, and how to overcome those obstacles.

Summary of potential commercial benefits to the fishing community of the research results:

The direct benefit to the fishing community is that fishers are learning the ike jime method, an age-old technique but new to most of these fishers, that could bring a new value-added market opportunity for various RI-local seafood species. This could also bring the secondary benefit of increasing the resiliency of RI commercial fishing industry and the communities that depend on it through (a) diversifying the seafood species being valued in the market, and (b) increasing economic viability of small-scale and part-time commercial fishers.

Proposal #:23GAR216-026

Project Title: *Pathway to Market Development: Establishing Kelp Purchasing Cycle Best Practices*

Applicant: GreenWave Organization Corp.

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Kendall Barbery, Programs Director, GreenWave Organization Corp., kendall@greenwave.org

Amount: \$152,759

Abstract: The U.S. commercial seaweed market is one of the country's most promising emerging industries, forecasted to grow 7% from 2022 to 2029. For fishermen and shellfish farmers, adding kelp cultivation to their business strategy offers the potential to manage risk by diversifying their crops, extending their growing season, and increasing revenue. While this nascent market offers potential economic benefits for fisheries and their stakeholders, farmers face a number of barriers to success. One of those barriers is mismatched expectations between farmers and their prospective buyers, which can result from a lack of shared understanding of the complexities—which include uncertainties involving production capacity, regulations, food safety, and processing—of an emerging agricultural supply chain. In order for the industry to expand, stakeholders across the value chain need education and resources to align their respective motivations and goals and develop successful long term purchasing relationships. Through the *Pathway to Market Development: Establishing Purchasing Cycle Best Practices* project, Connecticut-based 501(c)3 nonprofit GreenWave will advance this goal by establishing best practices for the seaweed purchasing cycle, with a focus on sugar kelp. The organization will work directly with farmers and buyers to promote and implement these purchasing practices, draft advance purchase agreements, and align expectations to ultimately lead to a coordinated scaling of supply and demand across the industry.

Summary of potential commercial benefits to the fishing community of the research results:

As a result of this project, kelp farmers and buyers will have the information and tools they need to establish productive long-term sales relationships. With reliable market relationships, kelp farmers, fishermen, and shellfish farmers will have the confidence to expand kelp crop output and increase revenue through sales to buyers in diverse markets, including consumer foods, agriculture, and bioplastics. With increased reliability of supply, buyers will be able to increase revenue through expanded kelp-based product lines. Within the GreenWave Seaweed Source network, we expect to see forward contracts for kelp crops to grow to 1 million lbs by the 2025 harvest season.

Proposal #: 23GAR233-056

Project Title: Increasing Local Seafood Consumption in NY Through Cooking Demonstrations and Tasting Events

Applicant: Cornell University Cooperative Extension Marine Program (CCE)

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Scott Curatolo-Wagemann, Senior Resource Educator, (631) 278-4260, sw224@cornell.edu

Amount: \$105,595

Abstract: CCE has been highly influential on local seafood marketing projects in NY since 2015. CCE's "Choose Local F.I.S.H." marketing/education initiative was implemented to brand and promote locally harvested seafood as Long Island "F.I.S.H." ± Fresh. Indigenous. Sustainable and Healthy. The initiative increased demand for local seafood through improved consumer awareness and integrated supply-side ability to support demand, resulting in greater economic value and income generation within fishing communities. Through the initiative, CCE is promoting and sustaining NY's wild-caught fisheries by merging the knowledge of Fisheries Specialists and commercial fishermen, the creativity of innovative chefs, the know-how of seafood businesses, and the enthusiasm of seafood lovers to advance a local food system that supports and sustains local waters and the community of people who rely on them. CCE has identified a high level of interest in seafood cooking education and opportunities to sample easy seafood recipes to increase the comfort level of the home chef. With SK funding, CCE will utilize the established framework to further magnify consumer/supplier commitment to local seafood, conduct 50 cooking demonstrations/tasting events, and create the "Meet the Fishermen That Feed You" marketing campaign to increase demand, value, and support for NY's commercial fishing industry.

Summary of potential commercial benefits to the fishing community of the research results: :

By raising awareness and interest in local seafood, this project will establish an upward demand curve, particularly for underutilized and lesser-known species, which will continue indefinitely once consumer attitudes are changed regarding purchasing local vs. imported seafood.

Increased demand for local seafood results in greater economic value and income generation for fishermen, seafood retailers and coastal communities. This project will keep NY's fishing industry competitive and sustainable while stimulating activity for this important segment of the economy. This industry is critical to the heritage and future of New York. This project will help ensure this industry remains viable and thriving.

Proposal #: 23GAR219-018

Project Title: Increasing Sustainability of the North Atlantic Squid Fishery: from Processing Waste to Value-Added Seafood Products

Applicant: The University of Maine System acting through the University of Maine

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Denise Skonberg, Professor of Food Science, School of Food and Agriculture, University of Maine, denise.skonberg@maine.edu; (co-PI's) Brianna Hughes, Vice President of Operations, Supply Chain and Quality, The Town Dock, Narragansett, Rhode Island, (bhughes@towndock.com); Robert Dumas, Food Science Innovation Coordinator and Pilot Plant Manager, School of Food and Agriculture, University of Maine (Robert.dumas@maine.edu)

Amount: \$229,376

Abstract: The two dominant squid fisheries in the Northwestern Atlantic are *Doryteuthis pealeii* (longfin inshore squid) and *Illex illecebrosus* (northern shortfin squid). Processing squid for the North American market results in approximately 50% byproduct by weight, comprised mainly of wings (fins), skin, and viscera. This squid byproduct is primarily disposed of in landfills but represents a robust source of raw materials for the creation of value-added food products for U.S. markets. The overall goal of this project is to develop appealing and convenient frozen food products formulated with upcycled squid wings. To address this goal, we will quantify the yield and characterize the quality of squid wings from the two species subjected to different processing and storage scenarios. The upcycled material will be used by a culinary team in the formulation of novel food products. The acceptability of the most promising formulated products will be evaluated in formal consumer sensory testing, and finally, the impacts of frozen storage on product quality will be determined. Prototype products and research results will be shared with diverse stakeholders including squid processors, professional chefs, food service operators, seafood technologists, consumers, and value-added seafood processors in seafood industry events, peer-reviewed journals, scientific conferences, and social media.

Summary of potential commercial benefits to the fishing community of the research results: This project seeks to promote the upcycling of squid byproducts, which make up approximately 50% of North Atlantic squid landings, into marketable food products. Developing value-added food products from processing waste will enhance product diversification efforts, and the commercial squid industry in the New England and mid-Atlantic regions will see direct benefits in terms of increased value of the harvested resource for local fishers as well as processors. Reducing waste generation will also contribute

to more competitive and sustainable U.S. squid fisheries, ensuring long term benefits to local fishing communities and consumers alike.

Proposal #: 23GAR235-058

Project Title: DEVELOPMENT AND APPLICATION OF GENOMIC TOOLS TO GUIDE MANAGEMENT OF THE ATLANTIC COD FISHERY

Applicant: University of New Hampshire (UNH)

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Adrienne Kovach, Associate Professor of Natural Resources & the Environment, University of New Hampshire, akovach@unh.edu; (co-PI's) Nina Overgaard Therkildsen, Assistant Professor of Natural Resources, Cornell University, Ithaca, NY; nt246@cornell.edu; Jeremy Collie, Professor of Oceanography, University of Rhode Island; jcollie@uri.edu; Steve Cadrin, Professor, University of Massachusetts @ Dartmouth, scadrin@umassd.edu; Carla Guenther, Chief Scientist, Maine Center for Coastal Fisheries (MCCF), Stonington, ME; cguenther@coastalfisheries.org; Erik Chapman, Director, New Hampshire Sea Grant, Durham, NH; erik.chapman@unh.edu

Amount: \$299,943

Abstract: A 2020 review by NOAA's Atlantic Cod Stock Structure Working Group (ACSSWG) concluded there are five biological stocks in US waters, instead of the two that are currently managed. Uncertainties remain about two of the newly identified biological stocks in understudied areas – southern New England and eastern Gulf of Maine (GoM). Further investigation of these populations was recommended by expert Peer Review of the ACSSWG report. Subsequently, the New England Fishery Management Council (NEFMC) and NOAA's Northeast Fishery Science Center (NEFSC) held a series of workshops to explore mechanisms and implications of incorporating these new stock delineations into existing management structures. In response to these developments, the Atlantic Cod Research Track Stock Assessment Working Group recommended that assessments be conducted at the scale of the four spatially distinct populations, with the western GoM assessed as one unit. Adopting this finer-scale management structure will require stock composition analysis to effectively monitor the spatially overlapping winter and spring spawning western GoM populations and accurately determine the composition of the mixed fishery. Yet, stock composition analysis is not currently implemented in management of the Atlantic cod fishery. Here, we address these priority needs with collaborative research that will provide managers with genomic tools and additional knowledge to implement management of cod stocks using the spatial units adopted by the Research Track Stock Assessment Process. We will collaborate with commercial and recreational fishermen to collect samples from cod for use in genomic investigations and the development of a genetic stock discrimination tool that distinguishes all five populations with high accuracy (95-99%), thereby allowing accurate stock composition for any area in US waters.

Summary of potential commercial benefits to the fishing community of the research results: This project benefits the productivity of the Atlantic cod fishery and the fishing community that relies upon it. Research will generate improved understanding of the cod fishery and inform and enable improved management of cod stocks through new tools – critical given concerns about the depleted state of the

cod fishery. Improved understanding of stock structure and a means for stock composition analysis will facilitate management to rebuild cod stocks, restore healthy marine ecosystems, and increase economic vitality of the fishing industry. Participation of fishermen in sample collection and knowledge sharing creates a new opportunity for the fishing community and develops new skills transferrable for participation in future monitoring programs.

Proposal #: 23GAR206-053

Project Title: Stock assessment model development and spatial management strategy evaluation for striped bass

Applicant: Virginia Polytechnic Institute and State University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: Yan Jiao, yjiao@vt.edu, Professor, Department of Fish and Wildlife, Virginia Tech

Amount: \$244,941

Abstract: The spatial structure of a population has been always of high concern in fisheries stock assessment because of the possible demographic heterogeneity, mixing among stocks, and local over- or under-exploitation. Atlantic coast striped bass from North Carolina through the Gulf of Maine support important commercial and recreational fisheries. Although the most recent stock assessment for striped bass used a one-stock age-structured model for management purposes, this migratory stock complex is known to be predominately composed of 3 biological stocks, i.e., Chesapeake Bay, Delaware Bay, and Hudson River stocks. Although the mixed-stock model was not accepted because of the lack of fit and key parameter assumptions, the idea and preliminary work considering the stock mix by ASMFC were strongly encouraged as future research in the most recent SARC review. In addition, managers and stakeholders have expressed strong interest in spatially explicit or stock-specific assessment tools to implement biologically, economically, and socially sound regulations within each jurisdiction and sector. Based on the existing tagging and mixed stock data availability, we propose to develop improved integrated “mixed” stock models using a Bayesian framework, and conduct a spatial management strategy evaluation (MSE).

Summary of potential commercial benefits to the fishing community of the research results: Migratory Atlantic coast striped bass support important commercial and recreational fisheries from North Carolina through Maine. This study will help better understand its population dynamics and management needs at a finer spatial scale, a key research priority for ASMFC. This study will integrate stakeholder interests and knowledge of striped bass life history. This study will provide a tool to evaluate alternative management strategies in a transparent and quantitative way. Project results will provide more robust sustainable management strategies critical for rebuilding striped bass and maintaining the long-term sustainability of the commercial and recreational fishing industries and the coastal communities that rely so heavily on this species.

Proposal #: 23GAR203-001

Project Title: Addressing a fishery disaster: Biological and environmental factors associated with the emergence of an undescribed apicomplexan parasite and the collapse of the bay scallop fishery in New York

Applicant: The Research Foundation for the State University of New York Office of Sponsored Programs, Stony Brook University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Bassem Allam, Marinetics Endowed Professor, School of Marine & Atmospheric Sciences, Stony Brook University, Bassem.Allam@stonybrook.edu; (co-PI's) Emmanuelle Pales Espinosa, Research Associate Professor, School of Marine & Atmospheric Sciences, Stony Brook University, Stony Brook, NY, emmanuelle.palesespinosa@stonybrook.edu; Stephen Tettelbach, Shellfish Ecologist, Cornell Cooperative Extension of Suffolk County, Cornell University, Southold, NY, stt47@cornell.edu; Harrison Tobi, Aquaculture Specialist, Cornell Cooperative Extension of Suffolk County, Cornell University, Southold, NY, hjt27@cornell.edu; Emma Green-Beach, Director, Martha's Vineyard Shellfish Group, Inc., Martha's Vineyard, MA, emma.greenbeach@mvshellfishgroup.org

Amount: \$299,987

Abstract: Since 2019, catastrophic mortalities of adult bay scallops (*Argopecten irradians* subsp. *irradians*) have occurred annually throughout the Peconic Bays (east end of Long Island, NY), leading the U.S. Department of Commerce to declare the bay scallop in NY a fishery disaster. These mortality events were associated with annual outbreaks of an apicomplexan parasite dubbed bay scallop Marosporida (BSM). Surveys in NY showed that disease prevalence and intensity have a clear seasonal signature and are strongly correlated to scallop mortality trends. Anecdotal observations reported differences in disease severity and mortality between different scallop stocks. Scallop mortalities associated with this infection have been so far only reported in NY. In this framework, our central objective is to identify disease and mortality risk factors in NY and potential for disease and mortality outbreaks in most productive bay scallop fishery grounds in the Northeast. This will be done by establishing the distribution of BSM in the region and unravel parasite, host and environmental factors that dictate the success or failure of the infectious process, and resulting scallop mortality. Doing so, we will evaluate the risk for disease outbreaks in other northeastern regions and identify potential management strategies to sustain a productive fishery.

Summary of potential commercial benefits to the fishing community of the research results: This project will address knowledge gaps related to factors that can dictate disease development and mortality outbreaks in a major local fishery, but also to the potential risk of disease spread to other productive regions in the Northeast. This project is directly relevant to the S-K program, since it fundamentally investigates the potential and the routes for maintaining a sustainable fishery, and examines the vulnerability of fishing communities. The project will provide information (e.g., distribution of the parasite in the Northeast, effect of temperature on disease dynamics) and biological resources to support resource management and restoration efforts.

Proposal #: 23GAR229-021

Project Title: Development of sustainable lobster pot baits made from invasive carp and marine fish processing waste

Applicant: Cornell University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Eugene Won, Cornell University, etw36@cornell.edu; (co-PI) Di Jin, Woods Hole Oceanographic Institution, djin@whoi.edu

Amount: \$300,000

Abstract: In response to the baitfish shortage currently faced by the New England lobster fishery, we propose to develop sustainably sourced, competitive bait products from 1) invasive Asian carp and 2) ensilaged marine fisheries processing byproducts. Readily available materials represent practical alternatives and can be easily produced from domestically available sources. Experimental baits will be developed with guidance from the lobster industry and compatible with common fishing gear and practices. Bait efficacy will be tested in controlled and field trials in collaboration with lobster fishers. Catch data will be incorporated into an economic analysis to determine the extent this bait may be adopted by lobster fishers, while adding value to carp and marine fisheries supplying the bait materials. Analysis will consider socio-economic benefits from reducing invasive carp populations, avoiding fisheries waste management expenses by repurposing seafood processing waste streams, and reducing pressure on wild-harvested forage fish that are traditionally used for lobster bait. We expect our research to have rapid transfer to industry through close collaborations with suppliers (carp and marine seafood processors), users (lobster fishers) and business entrepreneurs (our research partners) who will guide bait development and ultimately help with adoption of the new bait products by the lobster fishery.

Summary of potential commercial benefits to the fishing community of the research results:

Examining potential use of invasive carp and fisheries byproducts as lobster baits will help alleviate bait shortages faced by U.S. lobster fishers, which has inflated costs of traditional bait. By demonstrating efficacy of alternative lobster baits, domestic marine and carp fisheries will simultaneously profit from value-added products. Exploring bait markets for domestic lobster fisheries is intended to create value for these products, incentivizing expansion of invasive carp harvest, improve use of marine fishery resources, subsequently offsetting costly importation of lobster baits from overseas. Reducing invasive carp population through commercialization will have positive environmental and economic impacts in their introduced range.

Proposal #: 23GAR222-086

Project Title: Testing Subsea Acoustic Ropeless Gear Marking Technologies and Integrated Scientific Fisheries Data Collection Packages (the “SmartRaft”) to Address Vertical Line Closures in the Gulf of Maine.

Applicant: Blue Planet Strategies, LLC

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Roger Fleming, Policy Dir., Zack Klyver, Science Dir., Blue Planet Strategies, r Flemingme7@gmail.com

Amount: \$300,000

Abstract: Vertical buoy lines used by lobstermen to mark trap locations and haul gear to the surface can entangle endangered right and other large whales. Vertical line closures (“VLCs”) can reduce entanglement risk, but they exclude fishermen from favored fishing grounds resulting in severe economic harm to fishermen and fishing communities. Fishermen also face challenges from rapidly changing ocean conditions due to climate change. Traps raised from the sea floor with lift bags or stowed rope and buoys triggered acoustically from vessels (“on-demand” or “ropeless” gear) is being tested and increasingly relied upon to fish with fewer vertical lines -- and can provide access to VLCs. However, fishermen need accurate marking systems to locate their traps without the aid of surface buoys and set gear close to other fishing gear without conflict. Ropeless gear can also be outfitted with scientific instruments to collect acoustic data for whale detection and environmental monitoring. This data is urgently needed to build timely personal and shared databases to track changing conditions, which can help fishermen make better business decisions and improve fishery regulations. Two experienced fishermen will test the efficacy of subsea acoustic marking systems and integrated scientific data collection packages under real fishing conditions.

Summary of potential commercial benefits to the fishing community of the research results: Ropeless fishing gear using subsea acoustic marking technologies can enable fishing inside Vertical Line Closures, promising significant economic benefits to fishermen shut out of their fishing grounds, and mitigating impacts from potential vertical line reductions. SmartRafts can contribute to a new era of data-driven fishing to help sustain the lobster fishery in the face of rapidly changing conditions due to climate change by providing timely data to help fishermen make better business decisions and improve regulations. Two experienced fishermen will receive and test hull mounted transducers and ropeless fishing gear, including SmartRafts capable of collecting and transmitting valuable environmental data.

Proposal #: 23PIR707-011

Project Title: Refining Aquaculture Methods for Kūmū and Establishing Preliminary Tag and Recapture Efforts Utilizing Hawaii’s Fishing Community

Applicant: Oceanic Institute of Hawaii Pacific University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Chatham K. Callan, PhD, Finfish Program Director (OI) ccallan@hpu.edu; (co-PI’s) Spencer B. Davis, MS, Finfish Program Research Associate (OI) sbdavis@hpu.edu; Erik C. Franklin, PhD, Associate Research Professor, Hawaii Institute of Marine Biology (HIMB), University of Hawaii at Manoa, erik.franklin@hawaii.edu

Amount: \$299,900

Abstract: Kūmū, the Hawaiian white-saddle goatfish, is an overfished species treasured by recreational and commercial fishers for its cultural and economic value. The proposed project builds upon our current S-K project (2021-2023) by refining the recently developed aquaculture technology for kūmū (*Parupeneus porphyreus*), estimating abundance of wild kūmū populations to understand the relative contribution of stock enhancement, and releasing tagged, cultured kūmū in a preliminary recapture study with local fishing community participation. This work will demonstrate the stock restoration potential for this species. Oceanic Institute (OI), an aquaculture research institution with marine fish culture expertise, has developed effective technology for kūmū broodstock conditioning and has produced kūmū eggs and larvae using current S-K funding. OI will collaborate with the Hawaii Institute of Marine Biology (HIMB) of University of Hawaii, the State of Hawaii's Division of Aquatic Resources (DAR), and Pacific Islands Fisheries Group (PIFG) to perform abundance estimates and conduct a tag, release, and recapture study. Recreational and commercial fishers will participate in recapturing tagged kūmū. The proposed project will build upon our recent success in kūmū aquaculture, initiate a pilot scale stock enhancement program, enable new commercial ventures in the local aquaculture industry, and increase community support for local aquaculture.

Summary of potential commercial benefits to the fishing community of the research results

Kūmū is considered one of the most valuable reef fish in Hawaii, with whole fish fetching a market price of up to \$25/pound (\$55/kg). The refinement of successful culture protocols for this species will help inform future commercial-scale feasibility. Further, this study will initiate a pilot scale stock enhancement program and enable future large-scale stock restoration efforts which will benefit the commercial and recreational fisheries for this species.

Proposal #: 23PIR710-020

Project Title: Fresh Local Fish for High School & College Culinary Programs

Applicant: Pacific Islands Fisheries Group (PIFG)

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Clay Tam, PIFG Research Coordinator, pacificfisheries@gmail.com

Amount: \$239,429

Abstract: This project seeks to expand marketing networks and the sale of fresh locally caught pelagic species in Hawaii while exposing young aspiring students to potential culinary careers through hands-on opportunities in the classroom. Project collaborators include a wholesale distributor of fresh locally caught pelagic fish, college culinary arts chefs and high school culinary arts instructors. Together, the project team will source, purchase and distribute fresh pelagic fish to participating college and high school culinary arts instructors for use by students

in their sustainability-themed curriculum. Students are not offered the opportunity to work fresh locally sourced fish due to the high value of the product and limited budget of the high school and college culinary programs. Providing hands-on opportunities for culinary students to fabricate products using this highly valued fresh fish product will benefit students as they progress through their culinary careers. Objectives of this project will be to provide students and instructors: 1) access to fresh local fish for use in their culinary educational experience; 2) educational material on Hawaii's fresh local fish species, markets, management and industries; and 3) building networks between the culinary educators, fishing community and seafood community.

Summary of potential commercial benefits to the fishing community of the research results:

This project supports the local fishing community and seafood industry by building on established seafood distribution networks through the introduction of fresh local fish into Oahu's community college and public high school culinary arts programs. It also supports Hawaii's food service sector by providing young high school and college culinary arts students the opportunity to work with and fabricate products from locally sourced fish. These students represent future chefs and food service workers that will enter the industry educated and informed about Hawaii's local fish species, fisheries and local sustainability.

Proposal #: 23PIR705-018

Project Title: Optimizing Economic Benefits and Advancing the Promotion, Development, and Marketing of Hawaii's Local Fisheries

Applicant: Conservation International Foundation

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Matthew Ramsey, Senior Director, Conservation International Hawaii, mramsey@conservation.org; (co-PI) Jhana Young, Sustainable Seafood Manager, Conservation International Hawaii, jyoung@conservation.org

Amount: \$299,977

Abstract: This project will establish cross-sector collaboration and capacity building to develop value-added seafood products to optimize economic benefits to seafood producers, reduce seafood waste, and increase market demand for local seafood products in Hawaii. An estimated 40% of seafood in the United States is wasted and in Hawaii, where food security is a pressing concern, seafood accounts for the largest share of locally produced food in the state. This project will engage an established, multi-sector network of fishers, seafood distributors, chefs, educators, entrepreneurs, and marketing professionals who will both inform and benefit from this project.

CI will engage a local network of influential chefs and entrepreneurs who will develop a suite of value-added products and recipes utilizing seafood byproducts. Once developed, CI will host 3

events during its statewide direct-to-consumer seafood marketing campaign to promote and increase the demand for local value-added seafood products and recipes. In collaboration with NOAA's National Seafood Month, this campaign will include local, regional, and global promotional activities. This project will build on CI's successful market-based model which will promote better business practices, create local food products, increase revenue streams for 2 seafood producers and processors, reduce seafood waste, and create local economic opportunities.

Summary of potential commercial benefits to the fishing community of the research results:

Full utilization of the entire fish will help to increase value and decrease food waste in Hawaii fishing communities. This project will develop value-added products using lower grade parts of tuna for human consumption (e.g., cured bloodline), and non-human consumption (e.g., pet treats and fish skin leather). This will increase the availability of fish products, increase access to protein, and reduce fish waste disposal costs. Fishers will gain connections to buyers and the marketing strategies used will improve public relations around Hawaii-caught seafood. This effort will provide a scalable roadmap that can be applied to other U.S. fisheries.

Proposal #: 23PIR711-001

Project Title: Branding Hawaii Seafood with Fishing Community Outreach

Applicant: Hawaii Seafood Council

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: John Kaneko MS DVM, Program Director, john@hawaii-seafood.org

Amount: \$300,000

Abstract: Hawaii seafood competes directly with imported product in the Hawaii and US market. The proposed project, Branding Hawaii Seafood with Fishing Community Outreach, will distinguish the Hawaii Seafood brand by focusing on the unique attributes of the source. Hawaii is an important source of American-caught, fresh, high-quality Pacific bigeye tuna, yellowfin tuna and swordfish supplying the Hawaii and US market. Only a small portion (<2%) of the Hawaii landings are exported. Hawaii's primary fishing community and working waterfront is the Fishing Village at Pier 38 in Honolulu Harbor. It houses the iconic Honolulu Fish Auction, fishing vessels, processors, fishing gear, bait and ice suppliers, restaurants, and a retail fish market. The fish auction has become a distinguishing feature of the Hawaii Seafood brand. The project will improve consumer recognition of the value-added to Hawaii seafood products that are sourced through the Honolulu Fish Auction and are fully traceable to Hawaii-based fishing vessels managed by NOAA for sustainability. This will be done through fishing community outreach by providing consumers (residents, visitors, and others) the unique opportunity to experience and better appreciate the source of Hawaii Seafood through 1) Fishing Village/Fish Auction tours, 2) a web-based virtual tour, and 3) community outreach events.

Summary of potential commercial benefits to the fishing community of the research results:

Consumers are encouraged to “Buy Local” to support Hawaii food producers (farmers and ranchers), reduce dependence on imports, diversify the economy, preserve agricultural lands and keep food dollars circulating in the Hawaii economy. But Hawaii food production is hampered by high costs and fierce competition from imported products. The buy local sentiment is not enough to change consumer behavior to pay the price premium, especially for wild-caught Hawaii fish. The Hawaii fishing community will benefit from project efforts to explain the value-added that flows from the unique source that distinguishes Hawaii-caught fish from imports based on quality, safety and sustainability.

Proposal #: 23SER314-042

Project Title: Community-Based Queen Conch (*Aliger gigas*) Aquaculture in Puerto Rico for Restoration and Sustainable Seafood

Applicant: Florida Atlantic University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Megan Davis, Ph.D. Research Professor, Aquaculture and Stock Enhancement, Florida Atlantic University, Harbor Branch Oceanographic Institute, 5600 US 1 North, Fort Pierce, Florida 34946, 772-216-1523; mdavi105@fau.edu; (co-PI) Raimundo Espinoza, Executive Director, Conservación ConCiencia, 1625 Calle San Mateo, 3A, San Juan, Puerto Rico 00912, 787-902-7760, rai@conservacionconciencia.org

Amount: \$299,799

Abstract: The queen conch *Aliger gigas* is an important fishery in the Caribbean and is overfished. The Queen Conch Resources Fishery Management Plan is used to help rebuild conch populations in the U.S. Caribbean. The closed season in Puerto Rico’s jurisdictional water is August 1 to October 31, and harvest has been prohibited since 1997 in the U.S. EEZ off of Puerto Rico. Most conch fished in Puerto Rico are consumed locally with little export. With the decline in conch populations in state and federal waters, closed seasons, and disruption of conch habitats from hurricanes, conch is a prime candidate for aquaculture in Puerto Rico. The project goal will expand on the existing S-K NOAA supported Aquaculture Center, which is located at the Naguabo Fishing Association, to produce conch juveniles for restoration and sustainable seafood. Local fishers, technicians and interns will operate the aquaculture operation in Naguabo and at two additional fishing associations. Workforce development and training in aquaculture practices for fishers and community members will be conducted. This project will also investigate the market for queen conch shells, a by-product of the fishery. The project serves as a model that can be transferred to more fishing communities in Puerto Rico.

Summary of potential commercial benefits to the fishing community of the research results:

The benefits to the fishing communities include diversified incomes for the fishers that work on the conch aquaculture operations. In addition, the three Fishing Associations involved in this project will benefit from conch aquaculture being part of their working waterfront, because it will provide community outreach and ecotourism opportunities. Overall, the participation of the Puerto Rico fishing community in developing aquaculture projects will strengthen Puerto Rico's queen conch fishery and enhance the supply chain value of conch products in the marketplace.

Proposal #: 23SER327-028

Project Title: Development and Optimization of Farmer-Run Test Kits to Improve Oyster Safety

Applicant: Auburn University

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Andrea M. Tarnecki, PhD, Assistant Extension Professor, atarnecki@auburn.edu; (co-PI's) Taejo Kim, Ph.D., University of Wisconsin-Stout; kimt@uwstout.edu; Andy DePaola, Owner/Operator Depe Oysters LLC; andydepaola@gmail.com

Amount: \$298,701

Abstract: The National Shellfish Sanitation Program (NSSP) has established control plans to reduce the risk of shellfish-borne illnesses caused by the pathogenic bacteria *Vibrio parahaemolyticus* (Vp) and *V. vulnificus* (Vv). The few NSSP-approved *Vibrio* testing protocols are resource intensive and limit investigation of mitigations like refrigerated and high salinity wetstorage. Biphasic assays, developed by coPIs Kim and DePaola, reduce NSSP protocols to a single step that is completed in 18 hours, requires minimal equipment, and is inexpensive to perform. A model for on-farm use of these assays is currently employed at Taylor Shellfish Farms. The goal of this project is to expand farm-level testing by providing biphasic assay capabilities to a minimum of two Gulf coast farms, gathering data towards obtaining NSSP approval, and developing a proficiency test for use at all sites performing *Vibrio* testing. Through these efforts, combined with extension and outreach, we aim to empower farmers to lead testing efforts, increase consumer confidence in farm-raised oysters, and improve seafood safety, while collecting grower-gathered data to mitigate farm-level *Vibrio* risks in the Eastern oyster. These advances can increase local shellfish consumption and US competitiveness in the global shellfish market.

Summary of potential commercial benefits to the fishing community of the research results:

Current NSSP *Vibrio* protocols are laborious requiring specialized training, facilities, and equipment. Only a single certified laboratory nationwide is available to industry severely limiting risk reduction innovations and industry expansion. Simple and inexpensive biphasic

assay will allow on-farm testing, eliminating shipping costs/delays and reducing turnaround time by 1-2 days. Results of this project will empower the aquaculture industry to investigate mitigation approaches at minimal cost and accelerate innovation for pre-harvest practices and post-harvest processing. Establishing testing capability at West and Gulf Coasts farms will serve as a model for incorporating this technology into everyday farm operations nationwide.

Proposal #: 23SER303-025

Project Title: Feasibility analysis for artisanal native oyster mariculture supply chain in Culebra, Puerto Rico

Applicant: Mujeres de Islas (MDI) Inc.

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Nicolas Gómez-Andújar, Mujeres de Islas, nicolas@mujeresdeislas.org; Megan Considine, Mujeres de Islas, megan@mujeresdeislas.org; (co-PI) Megan Considine, Mujeres de Islas, megan@mujeresdeislas.org

Amount: \$299,811

Abstract: Puerto Rico's commercial fishing sector is a critical factor contributing to the territory's efforts to improve food security. However, the viability of commercial fishing in Puerto Rico (PR) has declined in recent years due to the impacts of frequent hurricanes, volatile tourist-based markets, and persistently low access to technological and financial capital (Agar et al., 2020) - economic alternatives are needed. Here we propose an oyster aquaculture feasibility study for native mangrove oyster (*Crassostrea rhizophorae*) and native Atlantic pearl oyster (*Pinctada imbricata*) mariculture. Establishing community-based mariculture operations on the island has the potential to increase food security, livelihood diversification, and economic resiliency of the Puerto Rican artisanal fishery. There are oyster mariculture industries that utilize these native oysters in the Caribbean, although the development of such an industry hasn't been realized in PR. The proposed research will address current knowledge gaps through four topic areas: oyster spat collection, oyster grow-out, market analysis, and fisher engagement. This project will inform best farm management practices, future hatchery techniques, market outlets and sales channels, community governance arrangements, and a regulatory roadmap for future sustainable aquaculture projects.

Summary of potential commercial benefits to the fishing community of the research results:

The participation of the local commercial fishing industry will take place during all project phases informing the existing levels of collective action and influence on community governance for future oyster mariculture opportunities. This project will provide an opportunity for fishers in Culebra to diversify their livelihoods in an industry adjacent and culturally

appropriate sector. This project will also assist in the development of a half-shell market in Puerto Rico, securing an economic alternative for fishers. Overall, this project will provide fishers with the opportunity to experiment with the first oyster aquaculture enterprise in the U.S. Caribbean since the 1970s.

Proposal #: 23SER301-031

Project Title: Development of Technologies using Black Soldier Fly Larvae to Efficiently Convert Seafood Processing Wastes into Value-Added Marine Feed Ingredients

Applicant: Texas A&M AgriLife Research, Texas A&M University System

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: Delbert M. Gatlin III, Ph.D., Regents Professor, Dept. of Ecology and Conservation Biology, d-gatlin@tamu.edu; Jeffery Tomberlin, Ph.D., Associate Professor, Dept. of Entomology, jeffery.tomberlin@ag.tamu.edu

Amount: \$265,478

Abstract: Approximately one third of fish biomass from global capture fisheries and aquaculture is wasted throughout the food supply chain. Many seafood processing plants pay for waste products to be removed and converted into low-value fertilizer or even added to landfills. Alternatively, production of black soldier fly (*Hermetia illucens*) larvae (BSFL) has emerged over the last several years as an efficient means to convert various kinds of organic materials into products including meals and oils for feeding to animals. Seafood processing wastes, which currently represent a costly liability to seafood processors, may be optimized as a suitable substrate for production of BSFL to yield products with nutritional characteristics similar to fishmeal and fish oil, both of which are often produced from fully exploited and highly regulated capture forage fisheries. Therefore, this proposal aims to develop substrates that efficiently use seafood processing wastes for production of BSFL while optimizing the composition of the resulting products for aquatic animals. Then, the most promising BSFL products will be evaluated as potential substitutes for fishmeal and fish oil in nutritional assessments (comparative feeding trials and digestibility determinations) using juvenile red drum (*Sciaenops ocellatus*) as a representative marine fish produced in aquaculture.

Summary of potential commercial benefits to the fishing community of the research results: Results from the proposed project may positively benefit several end users in Texas and elsewhere including seafood processing plants, BSFL producers, aquafeed production facilities, as well as aquaculturists. The broader societal impacts of the proposed research will include a more efficient and responsible utilization of various marine resources while enhancing the sustainability of seafood production from aquaculture. Furthermore, this work will be linked with the National Science Foundation Industry/University Collaborative Research Center for

Environmental Sustainability through Insect Farming (CEIF) (Tomberlin is the Director, Gatlin is a site Co- Director) as a means to leverage funds for conducting and expanding the proposed research, while engaging 14 companies from around the world on its value and potential means of implementation. By doing so, data will be transferred directly to end users, such as Mars Inc and Tyson Food Group. Furthermore, participating with the CEIF will allow for this project to be: 1) verified in terms of data generated and industry value, 2) applied through industry practice, and 3) expanded to include feedback from industry with development of future projects supported through the CEIF.

Proposal #: 23SER339-037

Project Title: Expanding Cultivated Oyster Mariculture in Texas

Applicant: Texas A&M University

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: Laura Picariello, Fisheries Specialist, Texas Sea Grant, lpicariello@exchange.tamu.edu; Mario Marquez, Aquaculture Specialist, Texas Sea Grant, mmarquez42@tamu.edu

Amount: \$300,000

Abstract: With Texas becoming the last state in the U.S. to legalize oyster aquaculture, there is a large potential for industry growth and expansion. At the same time, many of the Texas wild oyster fishery dependent communities have also been negatively affected due to permanent bay closures of over 2,000-acres beginning in the 2022-2023 oyster season affecting mainly socio-economically underrepresented minority fishing communities. Texas Sea Grant aims to conduct natural resource surveys in designated areas to create 20-acre oyster aquaparks in which farmers can obtain parcels to facilitate create more farmers and grow the aquaculture industry. Also, develop an oyster aquaculture curriculum and launch a 9-week course in English and Spanish for oyster farmer training. The project would also develop workshop technical training for oyster farmers on techniques and methods for developing and maintaining an oyster farm. Creation of the aquaparks would help grow the industry and create jobs for all Texans and specifically displaced oyster harvesters in a sustainable manner.

Summary of potential commercial benefits to the fishing community of the research results:

The potential commercial benefits to the fishing communities from this project would be a development of a new sustainable industry. Texas Sea Grant aims to conduct natural resource surveys in designated areas to create oyster aquaparks in which farmers can obtain 2-acre parcels to facilitate create more farmers and grow the aquaculture industry. Two 20-acre aquaparks could grow 300,000 oyster per acre yielding 12 million oysters annually worth over \$6 million dollars. Creation of the aquaparks would help grow the industry and create jobs for all Texans.

Proposal #: 23SER321-015

Project Title: Expanding Observer Coverage and Bycatch Species Identification to Achieve Sustainable Fishery Certification for the Gulf of Mexico Federal Otter Trawl Shrimp Fishery

Applicant: LGL Ecological Research Associates, Inc.

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) R. Taylor Beyea, M.Sc., LGL Ecological Research Associates, Inc., tbeyea@lgl.com; (co-PI) Nathan F. Putman, Ph.D. (LGL), Senior Scientist, nputman@lgl.com

Amount: \$299,767

Abstract: The federally-permitted penaeid shrimp fishery of the Gulf of Mexico is one of the nation's most valuable fisheries. However, bycatch associated with shrimp trawls presents a serious challenge for meeting requirements for certification as a sustainable fishery. Without such certification, the shrimp industry is likely to lose market share to international competitors and may have difficulty selling their product to major seafood buyers (Walmart, Kroger, etc.). After decades of effort to reduce bycatch, two barriers for certification of the federal otter trawl fleet remain: (1) low observer coverage (~2%) and (2) the "modified characterization protocol" of bycatch whereby a large percent is unidentified. This proposal will address both of these problems by building off two independently successful previous studies that (1) applied electronic monitoring (EM) on shrimping vessels and (2) obtained full characterization of bycatch species across the Gulf of Mexico. The research we propose will support the development/training of AI models being tested by NMFS. This project will benefit the shrimping industry, the NMFS observer program, fisheries managers, and U.S. consumers. The results will promote market demand, improve public relations for U.S. wild-caught shrimp and value-added of shrimp by promoting sustainable fishery practices, all consistent with S-K objectives.

Summary of potential commercial benefits to the fishing community of the research results:

Given our ongoing dialog with sustainable fishery certification experts, we are confident that the proposed work is necessary to resolve the two main barriers to achieve/maintain sustainability certification of the Gulf of Mexico federal otter trawl shrimp fishery. Our project directly involves the shrimping industry, government scientists, and certification experts. Results will help the shrimp industry to meet the requirements of major buyers, promote additional market demand from buyers requiring certification (e.g. from Europe, where there is a demand for large shrimp with sustainability certifications), improve public perception, and thus contribute to the stability and viability of the shrimp fishery.

Proposal #: 23SER311-023

Project Title: Louisiana Clams: Foundation of Novel Culinary Bivalves in Commerce

Applicant: Louisiana State University and A&M College

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Albert Gaudé, Coastal Fishery Agent, Louisiana Sea Grant Program agaude@agcenter.lsu.edu; (co-PI's) Dr. Earl Melancon, Oyster Specialist/ Professor Emeritus, emelancon@lsu.edu, Dr. Brian Callam, Director; Louisiana Oyster Hatchery, bcalla3@lsu.edu, Dr. Elizabeth Robinson, Louisiana Oyster Hatchery Manager, erobi22@lsu.edu, Jim Wilkins, J.D., Director, Sea Grant Law and Policy Program, jwilkins@lsu.edu

Amount: \$296,572

Abstract: The presence of the native bivalve, *Rangia cuneata*/ Gulf Wedge Clam, is abundant in Louisiana's brackish waters. Although historically consumed by First Nation occupants of the coastal regions, present day cultural preferences for other bivalves have all but deleted these bivalves from culinary attention. The primary resistance to general popularity has been the sometimes strong odor of geosmin, a metabolite found in blue-green algae which are often filtered and digested by *Rangia*. Recent refinements in depuration methods of alleviating the negative impact of geosmin has opened potential acceptance to this locally novel bivalve. To adjust for this opportunity, Louisiana Sea Grant has orchestrated official amendments in 2015 state regulations to allow for legal commercial harvest of *Rangia*, thus opening a way for initiating availability to the public via retail seafood outlets. With the refined techniques in palatability through depuration, this proposal will introduce both culinary and public consumers to this novel bivalve.

To develop a market for *Rangia*, this SK proposal seeks to introduce Louisiana clams into seafood markets, initially as a supplemental product through the state's Alternative Oyster Aquaculture (AOC) Program, where oysters, *Crassostrea virginica*, are presently raised to market in aquaculture cages. Wild, naturally occurring *Rangia* populations will be located and geo-referenced within the Barataria and Terrebonne estuaries, where the Louisiana AOC industry currently resides. The wild populations will be collected and assessed seasonally for the presence of geosmin to stimulate the potential for a wild-caught/ AOC-depuration fishery. Geosmin-laden clams will be transported for depuration to the lower Barataria estuary and placed in controlled studies at a commercial AOC facility and at the Sea Grant hatchery. Locating mid-estuary brackish water *Rangia* clams, which are euryhaline, to the lower estuary will also potentially improve salt content and flavor. The wild-caught, geosmin-free, depurated (and salty-flavored) clams will be assessed through a controlled consumer acceptance panel, including development of novel culinary dishes, and distributed through local markets to determine acceptability.

Summary of potential commercial benefits to the fishing community of the research results:

Although it has long been recognized that Louisiana waters have bivalves, other than oysters, that are suitable for commercialization, such utilization is only now becoming possible due to

recent regulatory, industry and technical developments. To assist traditional and aquaculture shell fishers, this proposal will provide a novel wild harvest of a potentially marketable bivalve and add to the economical formula of AOC fishers. This clam is found throughout the northern rim of the Gulf of Mexico and can be utilized coast-wide based on the example of the Louisiana exploitation model. Guidelines for this new industry will be developed and distributed by Louisiana Sea Grant marine extension team. This project will identify suitable wild populations of these clams, demonstrate harvest methods to fishers, and demonstrate their potential role in Louisiana culinary circuits. With the connections and history of assisting Louisiana fishery industries through product development, Louisiana Sea Grant will maneuver through regulations and protocol to bring these bivalves into both wholesale and retail markets. This product development will use techniques and opportunities which have only recently become available. Domestic consumption, tourism and recreational clamming activities will likewise be highlighted through local communities and governments.

Proposal #: 23SER325-006

Project Title: Enhancing U.S. Caribbean Deepwater Snapper Fisheries: Collaborative Research to Address Critical Information Gaps for Queen and Silk Snappers

Applicant: University of South Carolina

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: Virginia Shervette (shervette@gmail.com), USC; Jesús Rivera Hernández (jmrh.tilly@gmail.com), USC; Kate Overly (katherine.overly@noaa.gov), NOAA NMFS; Wilson Santiago Soler (wsantiago97@live.com), PR DNER; Daniel Basick (dabasick@yahoo.com), St. Thomas Fisher

Amount: \$299,600

Abstract Regional Fisheries Management Councils cannot effectively accomplish their goals with respect to sustainable fisheries management without assessing species. No peer-reviewed published research exists on basic life history for the Caribbean deepwater snapper (DWS) fishery species queen and silk snappers. The only stock assessment conducted for U.S. Caribbean deepwater snappers focused on silk and queen snappers and concluded, “Given the data limitations, projections for future status could not be constructed.” The review panel for the assessment stated, “Basic life history information from the U.S. Caribbean is considered to be extremely important to more fully assess the status of the stocks.” In Puerto Rico (PR), queen and silk snappers rank in the top two commercially landed fish species; in St. Thomas-St. John STT/J, queen and silk snappers are characterized as a virgin fishery. The two goals of our study are to: 1) Fill in critical life history gaps for PR queen and silk snappers so that stock assessments can be conducted using current, region-specific data and ultimately result in sustainable management of these species; 2) Obtain critical baseline life history information for queen and silk snappers from the STT/J island management platform as a first step in evaluating the potential for developing a sustainable DWS commercial fishery for the region.

Summary of potential commercial benefits to the fishing community of the research results: The focus of our collaborative investigation is to provide comprehensive life history information on queen and silk snappers, two top fisheries species in the U.S. Caribbean. The primary goal of fisheries management is to ensure the long-term sustainable harvest of species while at the same time balancing cultural, economic, and food security needs of a jurisdiction. Our research will provide extensive life history data for upcoming stock assessments so that resulting management strategies are based on current, regional scientific information obtained collaboratively with local fishers. Additional benefits from our efforts include building trust among stakeholders in the fisheries management process.

Proposal #: 23SER332-021

Project Title: Molecular Approaches to Sex-Identification in Reef Fishes from Non-Invasive Tissue Samples.

Applicant: Texas A&M University – Corpus Christi

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) David S. Portnoy, Associate Professor, Texas A&M University – Corpus Christi; david.portnoy@tamucc.edu; (co-PI's) Christopher Hollenbeck, Assistant Professor, Texas A&M University – Corpus Christi, christopher.hollenbeck@tamucc.edu , (361)-825-6022; Dr William Patterson III, Professor, University of Florida, will.patterson@ufl.edu , (352)-273-3647

Amount: \$298,639

Abstract: Identification of sex in fisheries species is important because it allows scientists and managers to account for sex-specific behaviors, sex-specific mortality rates, and track sex ratios. For many fish species, sexual dimorphism is subtle, and an assessment of sex requires visual inspection of gonads, making lethal and destructive sampling necessary. This creates problems when studies require the release of live animals along with knowledge about sex. Because some fishes have genetic sex determination, an alternative strategy would be to genotype individuals at genetic markers diagnostic of sex. This approach is advantageous because sex can be characterized using genetic approaches in individuals at any life stage and in any condition, requiring only small tissue samples that can be acquired non-lethally. For species that change sex, differences in gene expression at specific genes can be utilized similarly. Therefore, we propose to develop a non-lethal technique capable of determining sex from many samples, in an efficient manner for three important fisheries species, red snapper (*Lutjanus campechanus*), gray triggerfish (*Balistes capricus*) and gag grouper (*Mycteroperca microlepis*) obtained in cooperation with recreational and commercial fishers in the Gulf of Mexico.

Summary of potential commercial benefits to the fishing community of the research results: The proposed research will develop a cutting-edge genetic technique for determining sex for red snapper, gray triggerfish and gag grouper, which are all important species in U.S. recreational and commercial fisheries. The technique developed will allow researchers to determine the sex of large numbers of fish efficiently and across life stages, without sacrificing animals. The inclusion of sex specific information in fisheries research will create better data for stock assessments and benefit fishers by decreasing the

buffer between the overfishing limit and acceptable biological catch. The project provides benefits across fisheries because the techniques can be applied to other species.

Proposal #: 23SER313-040

Project Title: Improving the sustainability and value of the Caribbean spiny lobster (*Panulirus argus*) fishery with the help of the industry

Applicant: Florida Fish and Wildlife Conservation Commission

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Dr. Erica Ross, Florida Fish and Wildlife Research Institute Assistant Research Scientist, Erica.Ross@myFWC.com; (co-PI) Casey Butler, Assistant Research Scientist, Casey.Butler@myFWC.com; Tom Matthews, Program Administrator, Tom.Matthews@myFWC.com, May Lehmensiek, FWC Center for conservation social science, May.Lehmensiek@myFWC.com

Amount: \$284,079

Abstract: The economic potential of Florida's spiny lobster fishery is underrealized and the market remains highly volatile, epitomized by most harvest occurring at times of low demand. There is a pressing need to align fishing practices, engage fishers, and diversify markets for better value and price stability. We propose to better align the biological, social, and economic forces facing the fishery. First, discard mortality of lobsters used as bait accounts for approximately 20% lost value to the fishery. We will work with commercial fishers to evaluate how discarding weak bait can improve catch per trap and overall harvest. Second, we will conduct a situation assessment of the participants – crew, captains, boat owners, and fish house managers/owners – in the lobster fishery to understand their perspectives on current challenges, and goals for future development and opportunity within the industry. Third, instability of the live export market (e.g., COVID, tariffs, and the economy) has exposed a need to diversify market opportunities, most importantly local markets that have added economic multipliers and build community relationships. We will partner with Sea Grant to define the value of the lobster industry beyond just landings and model the potential of local markets to add value to the economy.

Summary of potential commercial benefits to the fishing community of the research results Improving baiting practices, better social understanding of the fishery, and increasing regional market opportunities will increase the economic potential of the lobster fishery. Improving current baiting practices will reduce fishery discards and improve fishery sustainability. We will directly ask fishermen how to meet their needs and maintain a future for the fishery. We will identify potential ways to build social capital between fishers, the public, and fishery managers to diversify markets and increase community support for local fisheries and fishers. By identifying the value of the lobster fishery beyond landings, this project provides data needed to preserve the fishing industry.

Proposal #: 23SER306-035

Project Title: Refining Ecological Reference Points for Atlantic Menhaden

Applicant: University of Florida

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Dr. David Chagaris, Research Assistant Professor, Nature Coast Biological Station, University of Florida, dchagaris@ufl.edu; (co-PI) Dr. Andre Buchheister, Associate Professor, Department of Fisheries Biology, Cal Poly Humboldt, 1 Harpst St, Arcata CA 95521; phone: 707-826-3447; andre.buchheister@humboldt.edu

Amount: \$226,324

Abstract: Atlantic menhaden (*Brevoortia tyrannus*) are a small pelagic fish that are prey for many marine predators, and they also support the largest commercial fishery on the U.S. east coast, at 145,000 mt/yr worth over \$40 million USD. In 2020, ecological reference points (ERPs) were adopted for managing the fishery with broad public support for the objective of sustaining both menhaden and their predators. Those ERPs were developed using an ecosystem model of the Northwest Atlantic Continental Shelf (NWACS), which included menhaden and five other managed species that are connected through food web interactions. The ERPs were based on the tradeoff relationship between menhaden harvest and striped bass biomass, marking the first formal interdependent multispecies reference points ever adopted in the U.S. However, continued investment in model development is required to ensure the ERP process remains viable and the models continue to evolve with management needs. This project will update the NWACS model and implement seasonal and spatial dynamics to represent the time-space overlaps of menhaden and their predators. The updated models will be co-developed with the Atlantic States Marine Fisheries Commission (ASMFC) for the 2025 ERP benchmark assessment and new reference points and management advice will be developed.

Summary of potential commercial benefits to the fishing community of the research results: The ERPs developed in this project will impact management for some of the most valuable fisheries on the U.S. east coast. Without objective, model-based reference points that utilize the most recent data, menhaden management could be overly-conservative, leading to foregone yield in the commercial fishery. If not conservative enough, then menhaden and predator populations may suffer, and valuable recreational fisheries would also be impacted. The economic impact these fisheries have on coastal communities is large, and we speculate that the combined benefits of ERP-based policies resulting from this project would be on the order of tens of millions of dollars.

Proposal #: 23SER334-004

Project Title: Quantifying and Reducing Discard Mortality of Undersized and Ovigerous Crabs in the Gulf of Mexico Blue Crab Fishery

Applicant: The University of Southern Mississippi

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) M. Zachary Darnell, Associate Professor, Division of Coastal Sciences School of Ocean Science and Engineering, The University of Southern Mississippi, zachary.darnell@usm.edu; (co-PI's) Luke Fairbanks, Assistant Research Professor, The University of Southern Mississippi, luke.fairbanks@usm.edu; Helen D. Olmi-Graham, Postdoctoral Research Associate, The University of

Southern Mississippi, helen.olmi@usm.edu ; Marcus Drymon, Assistant Extension Professor, Mississippi State University, marcus.drymon@msstate.edu

Amount: \$296,740

Abstract: This project seeks to quantify and reduce discard mortality in the Gulf of Mexico blue crab fishery. Discard mortality (mortality of nontarget individuals caught as bycatch, also referred to as bycatch mortality) is a serious concern for many fisheries and estimates of discard mortality have been identified as a critical research need for management of the blue crab fishery. We will integrate bycatch surveys, field experiments, and an improved understanding of crabber knowledge, strategies, and behaviors to quantify discard mortality and develop best practices for reducing discard mortality. Results will be disseminated to the management community, commercial fishing industry, and the public through a comprehensive extension, education, and outreach plan.

Summary of potential commercial benefits to the fishing community of the research results: This study will contribute to our understanding of discard mortality—an often cryptic contributor to total mortality—in the blue crab fishery. Both state and regional management agencies have recognized limited understanding of discard mortality as a major gap hindering blue crab stock assessments and fisheries management efforts in the Gulf of Mexico (GoM). We seek to quantify and reduce discard mortality in the GoM blue crab fishery. We will disseminate results and best practices to managers and the fishing industry; this will improve assessment and management, encourage practices that reduce discard mortality, and contribute to blue crab fishery sustainability.

Proposal #: 23WCR408-012

Project Title: Development of Hatchery Technology and Juvenile Grow-Out Techniques for Warty Sea Cucumbers (*Apostichopus parvimensis*)

Applicant: Hubbs-SeaWorld Research Institute

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting (Aquaculture)

Principal Investigator: (PI) Mark Drawbridge, Senior Research Scientist (mdrawbridge@hswri.org); (co-PI) Yuanzi Huo, Research Scientist, HSWRI, (yhuo@hswri.org)

Amount: \$299,983

Abstract: Warty sea cucumbers (WSCs; *Apostichopus parvimensis*) represent a high-value fishery in southern California where commercial landings have decreased dramatically because of overfishing. Accordingly, there is an urgent need to develop WSC aquaculture to reduce fishing pressure and offer the option of restoring the depleted stocks through out-planting. WSCs are known to inhabit coastal bays and estuaries in relatively shallow water, which suggests a high thermal tolerance, thus making them an attractive candidate species for aquaculture development in the south. However, information about spawning and rearing of early life stages of WSC is almost nonexistent. Thus, hatchery production of juveniles is still a missing link in developing WSC aquaculture and also in providing basic biological knowledge.

The goal of this project is to develop WSC hatchery and grow-out techniques. Six objectives will be used to achieve this goal, including: 1) establishing reliable spawning techniques; 2) optimizing planktonic larval culture techniques; 3) refining larval settlement induction techniques; 4) optimizing juvenile nursery phase culture techniques; 5) developing juvenile grow-out techniques; 6) documenting and disseminate all results and findings. The results of this project will help to establish WSC aquaculture in the USA as a new species for human food and fisheries conservation.

Summary of potential commercial benefits to the fishing community of the research results

This project will develop hatchery and grow-out techniques for WSCs as a new aquaculture species to help marine farmers diversify their product lines, and maximize profit and sustainability. Positive attributes of WSC aquaculture include: 1) high market value, 2) low production costs, 3) high productivity per unit area, 4) multiple uses, and 5) resilience against climate change. WSCs from aquaculture can be used as a source of food for people and also for conservation through stocking. This last benefit is favorable to fishermen and farmers, and the seafood industry. It will also inform the culture of other sea cucumber species.

Proposal #: 23WCR409-015

Project Title: Exploring the Feasibility and Design of a Fresh Catch Auction in San Diego

Applicant: Mark Helvey, markhelvey2@gmail.com

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Peter Halmay, President, San Diego Fishermen's Working Group, peterhalmay@gmail.com; (co-PI's) David Haworth, Director, San Diego Fishermen's Working Group; Pete Grillo, Atlantic Pacific Tuna Inc; Mark Helvey, Sustainable Seafood Consultants, LLC; Steve Scheiblaue, Marine Alliances Consulting

Amount: \$285,710

Abstract: The project proposes to investigate the pros and cons of various auction types used both domestically and internationally and use that information to inform an Auction Stakeholders Group (ASG). The group would be formed as a part of this project and be comprised of local harvesters and buyers, port representatives, and at least one expert familiar with existing U.S. auctions. Lead by a professional facilitator, the ASG would develop consensus on proceeding with a demonstration auction in San Diego and advise on what type of auction process would be used, how fishermen would relay their catch to the auction house in advance, how potential buyers would be notified, how fish would be graded, how transactions would be conducted and monitored, and how fish would be delivered to the buyer. Based on the initial auction, the ASG would be reconvened to review the results and determine whether future auctions are feasible and practical. All results of the project would be documented and distributed to various fishing organizations throughout California and possibly beyond. The

results would also be shared with the Pacific Fishery Management Council. A final report prepared for the SK leadership will document all findings and recommendations.

Summary of potential commercial benefits to the fishing community of the research results:

A fish auction based in San Diego has the potential to increase the resilience and economic competitiveness of the U.S. seafood sector in the San Diego region. Such an innovative approach in San Diego would establish a competitive bidding process for selling large volumes of fish, reflecting the winning bidder's willingness to pay. Buyers would purchase only what they wanted and fishermen could fetch higher prices than currently due to increased competition and quality differentiation where more desirable product commands a market premium. A San Diego fish auction could also incentivize fishermen to provide higher-value fresh products through better handling in order to capture better pricing. The auction process can be designed to sell all the fish on offer at prices set by competitive bidding, eliminating storage requirements and reducing marketing costs. All financial benefits to fishermen will directly flow back into the local community. In summary, the establishment of a fish auction would directly benefit San Diego-based fishermen and the local fishing community by 1) accommodating larger volumes of product; 2) providing an efficient price-setting mechanism; 3) expanding demand for domestically caught commercial seafood; 4) making fishing activities more visible to the public for promoting the consumption of local seafood; 5) reducing storage and marketing costs; 6) boosting competition; and, 7) diversifying options for fishermen to sell their catch. Finally, the results of the proposed project will inform the efforts of the San Diego Policy & Innovation Center which was recently awarded a USDA grant to revive the San Diego Fishermen's Marketing Association to better coordinate restaurant outreach and consumer marketing for increased local fish purchases. An auction would serve to augment those purchases. The proposed project directly supports the goal of the Saltonstall-Kennedy program's Priority #1 – Promotion, Development, and Marketing as the project intends to increase market demand for domestic seafood, add value to commercially caught fish species, improve business practices through increased transaction efficiency, and provide the infrastructure for U.S. fisheries to expand domestic production and better compete in global markets.

Proposal #: 23WCR416-011

Project Title: Hook, Line, & Social Media: A Case Study Using Digital Marketing to Motivate Consumer Participation in the San Diego Seafood System

Applicant: Elizabeth Penniman DBA Katuvi

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Huntley Penniman, huntley@katuvi.com; (co-PI's) Emily Miller, Chef Christina Ng, Mark Helvey

Amount: \$298,450

Abstract: San Diego’s fishing industry, which consists of about 130 commercial fishers and a growing number of seaweed and shellfish farmers, provide fresh, locally caught seafood to an ever-growing community of consumers wishing to make positive environmental and health choices. Yet, much of the San Diego public remains naïve about the diversity and availability of these sustainable and nutritious resources practically at their doorstep. The goal of this project is to build and execute a consumer awareness digital marketing campaign leveraging the existing Fishful Future website and Instagram accounts, a digital newsletter, a second social media account, and influencer marketing. This campaign will increase consumer awareness and familiarity with locally landed seafood species, the local seafood system, and home culinary approaches that are tailored for cultural relevance to the heterogeneity communities living in San Diego. By working with the fishing community, chefs, a diverse cross-section of community influencers, and seafood consumers, this campaign will raise the profile of locally landed seafood for consumers and support the need of San Diego fishers to market their products directly to consumers in a market flooded with imports.

Summary of potential commercial benefits to the fishing community of the research results: A digital marketing campaign for San Diego seafood will function as a tool for increasing consumer awareness of locally landed seafood options. This campaign will reach audiences with cultural values and uses for diverse, local seafoods, as well as empowering other audiences with the knowledge and skill to purchase and prepare seasonally abundant and unprocessed local species. The latter is an essential step to encourage direct purchasing. Digital venues, including a dedicated website and social media, are a cost-effective way to overcome the physical constraints of San Diego’s limited direct-to-consumer market. Benefits for San Diego fisheries include higher visibility for their catch and growth of social networks that foster direct sales, entrepreneurial partnerships and community advocacy for local fisheries.

Proposal #: 23WCR418-033

Project Title: A Seafood Equity Hub: addressing barriers to seafood in low-income food-insecure communities using domestic production and supply chains

Applicant: Heather Fenney (PI), Co-Executive Director, Community Services Unlimited, heather@csuinc.org

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI) Heather Fenney, Co-Executive Director, Community Services Unlimited, heather@csuinc.org ; (co-PI’s) Dr. Amalia Almada, Science, Research & Policy Specialist, USC Sea Grant, amaliaal@usc.edu ; Maria Madrigal, Education Program Specialist, USC Sea Grant, mdmadrig@usc.edu ; Dr. Anna J. Kim, Associate Professor, San Diego State University, anna.kim@sdsu.edu ; Dr. Diane Kim, Holdfast Aquaculture LLC Co-Founder & CEO,

holdfastAQ@gmail.com ; Dr. Victoria Campbell-Arvai, Assist. Prof, University of Southern California, vec@usc.edu

Amount: \$300,000

Abstract: The success of the US seafood industry over the long-term will be reliant on broadening its consumer base; improving access is good for the bottom line. To this end, we aim to develop a seafood distribution framework (i.e., Seafood Equity Hub) which expands sustainably grown aquaculture products to new food markets in lower-resourced and culturally diverse communities across Los Angeles. We see seafood-focused food hubs as a natural extension of ‘community supported fisheries’, with the additional integration of intermediary consumers (i.e., restaurateurs, retailers, community based organizations) that mitigate seafood producer costs associated with marketing, distribution, and consumer education. Such a model allows for competitive pricing for producers while supporting affordable access to lower-resourced consumers. This effort will i) Establish an actionable framework for a Seafood Equity Hub sustained in LA County; 2) Continue to build demand for and access to local aquaculture products among lower-resourced communities of color in Los Angeles; these communities are a significant and untapped consumer base with strong cultural relationships to seafood; and 3) Expand evidence of sustainable and profitable business practices that improve market access to domestic seafood products.

Summary of potential commercial benefits to the fishing community of the research results: Our model for a Seafood Equity Hub in Los Angeles California will secure **competitive pricing** for local producers, while **increasing and diversifying market demand** for local aquaculture products. Results from our study will inform challenges and opportunities for producers to participate in the hub, including but not limited to identifying necessary price points and production volumes, logistical and other supply chain gaps, and best practices to expand the network. Importantly, the hub will leverage the unique juxtaposition of lower-resourced communities with Los Angeles consumers who have greater purchasing power, all connected to a growing sustainable aquaculture industry.

Proposal #: 23WCR404-020

Project Title: *Restaurants as Partners in Sustainability: North Pacific Sablefish Promotion Project*

Applicant: Eat on the Wild Side (EOWS)

Priority Addressed Priority #1 – Promotion, Development and Marketing

Principal Investigator: (PI's) Robert Alverson, Executive Director of EOWS roberta@fvoa.org; Katie Harris, Operation and Marketing Coordinator of EWOS katie@fvoa.org

Amount: \$233,760

Abstract: Eat on the Wild Side (EOWS) is a non-profit organization working on behalf of North Pacific halibut and sablefish fisheries. As an accredited Marine Stewardship Council (MSC) certifier, EOWS contracts with processors adhering to specifications set forth by global sustainability organizations. EOWS wants to expand its support to include improved marketing strategies for sablefish. With this grant, EOWS will develop and implement a marketing campaign designed to increase sablefish product awareness by educating restaurant service staff, allowing them to be able to speak informedly about the fishery's sustainability. EOWS anticipates this project will benefit fishing communities by increasing domestic demand for sablefish, further leading to a reduction of the fishery's carbon footprint, a lowering of its transportation costs, and a steadying of product market value. EOWS will build a team of strategic partners including sablefish community members and vessel owners, the MSC Content Marketing Manager, visual marketing specialists, and commercial fish processors to design the campaign and to engage restaurants. This relates to Priority #1 in that it involves participation of the seafood industry, develops collaborative relationships amongst stakeholders, and works to increase market demands.

Summary of potential commercial benefits to the fishing community of the research results: EOWS wants to help fishing communities develop greater domestic consumption so as to move beyond heavy reliance on overseas buyers. The potential commercial benefits to fishing communities and operations include a projected increase in consumer demand, a reduction in the fishery's carbon footprint, a lowering of transportation costs for fishing operations and processors, and a steadying of the fish's market value when tied more closely to the U.S. dollar.

Proposal #: 23WCR402-023

Project Title: Developing and Testing Sustainable Transition Options for the West Coast Driftnet Fishery

Applicant: Pflieger Institute of Environmental Research

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI;s) Chugey Sepulveda, PhD Senior Scientist, Chugey@pier.org ; Scott Aalbers, Research Associate, Scott@pier.org

Amount: \$263,838

Abstract: This study will work with cooperative fishers, markets, and managers to test under exempted status a deep-set gear design that is specifically tailored to accommodate vessels of the CA drift gillnet fishery (DGN), a federal gear type that is being phased-out off California. The proposed study will work with cooperative fishers to expand depth-based targeting techniques employed in recent SK research (NA10NMF4270002, NA14NMF4270053) to accommodate the needs of the remaining DGN fleet. This study will outfit 3 to 5 DGN vessels with Extended Linked Buoy Gear (XLBG) and test performance and economic viability under exempted status through the Pacific Fisheries Management Council (PFMC).

PIER will support and manage EFP activities and collect data on catch composition and gear performance while providing this fleet with an option for continued employment. All operations will be electronically monitored and fishing efforts will be focused on portions of the coast that are currently underutilized/not fished. All objectives will be carried out with oversight from the PFMC and its Advisory Bodies and subsequently published in peer-reviewed scientific literature. The project will also include a robust outreach campaign that targets both fishermen and consumers highlighting the benefits associated with supporting locally sourced sustainable seafood.

Summary of potential commercial benefits to the fishing community of the research results: This study will increase the production of domestic swordfish caught by a CA fleet that is now being phased-out of existence by CA state legislature. The work expands highly-selective deep-set methods to areas that are currently not fished by US fleets. This expansion will directly benefit fishers by: (1) Providing increased access to local underutilized resources, (2) bolstering domestic seafood production and associated revenues, (3) diversifying and expanding access to the deep-set fishery and the areas currently fished and (4) informing consumers on the importance of supporting sustainable domestic operations over foreign sourced seafood.

Proposal #: 23WCR401-004

Project Title: Fisheries-driven assessment of a stock enhancement program for white seabass (*Atractoscion nobilis*) using novel genetic markers and a 25-year broodstock baseline

Applicant: Hubbs-SeaWorld Research Institute

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: (PI) Dr. Ruairi MacNamara, Research Scientist – Hubbs-SeaWorld Research Institute, rmacnamara@hswri.org; (co-PI's) Mark Drawbridge, Senior Research Scientist – Hubbs-SeaWorld Research Institute, 2595 Ingraham Street, San Diego, CA 92109, Phone: 619-226-3943, mdrawbridge@hswri.org; Michael Shane, Research Scientist – Hubbs-SeaWorld Research Institute, 2595 Ingraham Street, San Diego, CA 92109, Phone: 619-226-3946, mshane@hswri.org; Dr. Tanya Darden, Director, Marine Resources Research Institute – South Carolina Department of Natural Resources, 217 Fort Johnson Road, Charleston, SC 29412, Phone: 843-953-9819, dardent@dnr.sc.gov;

Amount: \$299,902

Abstract The Ocean Resources Enhancement and Hatchery Program was established by legislation in 1983 to evaluate the feasibility of restoring depleted fishery resources using stocking. In 2017, an external review concluded that hatchery-reared white seabass made up <1% of the adult fishery in California, based on coded-wired-tag (CWT) recaptures. A more recent study using genetic tagging suggests that hatchery contribution of subadults and adults is considerably higher. The new methodology uses a 15 loci microsatellite panel and broodstock parentage model spanning 25 years with ~95% genetic coverage. To address the very different contribution estimates, further evaluation is warranted. We will work directly with fishers to undertake a comprehensive assessment of hatchery contribution to recreational and commercial fisheries in Southern California and adjacent waters (Central California and Baja California) using genetic tagging. White seabass heads will be examined for the retention of CWTs, and otoliths will be extracted for aging and intrinsic chemical (stable isotope)

analysis of their cores, as additional tools to validate genetic assignment. A pilot angler-assisted fin clip program will also be developed to expand the geographic scope and to test an assessment approach that does not require fish head collection but allows for genetic characterization.

Summary of potential commercial benefits to the fishing community of the research results: Our preliminary research raised questions about the longer-term retention of CWTs in white seabass; therefore, a comprehensive assessment of hatchery contribution to fisheries using contemporary genetic methods will be undertaken. Developing our genetic tagging framework, which includes associated sample collection programs and validation tools, will allow for more streamlined and robust evaluation of stocking success going forward, in addition to facilitating research opportunities that have not been possible to date (release of smaller fish, selective parentage, etc.). Ultimately, this project will benefit the fishing community by improving the stock enhancement program they support via license stamps and volunteer participation.

Proposal #: 23WCR417-037

Project Title: Electronic logbook for US West Coast North Pacific Albacore Fishery

Applicant: American Albacore Fishing Association

Priority Addressed Priority #2 – Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting

Principal Investigator: Joshlyn Hardwick, Deputy Director of Operations, admin@americanalbacore.com

Amount: \$285,097

Abstract: The American Albacore Fishing Association (AAFA), a non-profit organization representing North Pacific Albacore (NPA) fishermen, is proposing to work with National Oceanic Atmospheric Administration (NOAA) and Bluefin Data, LLC (BFD) to modernize the data collection and throughput of North Pacific Albacore data by developing and implementing an electronic logbook (eLogbook), with the goal of fully transitioning the fleet away from paper logbook data collection.

Current paper logbook data collection and the subsequent data entry into National Marine Fisheries Service and Pacific Fisheries Information Network (PacFIN) databases is both inefficient and resource intensive. There is often a significant delay in logbook data entry from time of receipt by NFMS. The lack of timely delivery of important fishery data and statistics coupled with the additional issues of harvester non-compliance, threatens the sustainable management of NPA and the industry the fishery supports.

The U.S. NPA fishery is under the jurisdiction of several Regional Fishery Management Organizations (RFMO) and is party to the U.S.-Canada Albacore Treaty. The U.S. is obligated to meet the standards described in the agreements for each of these organizations. Specifically, the U.S. must supply timely fishery data from its active NPA pole and line and troll fleets. The U.S. has been historically inefficient at providing these statistics. Without timely and accurate information on catch, effort, location, or gear type, U.S. government officials, fishery managers, fishery scientists, fishery economists, and industry will not have current and accurate information when necessary.

The development of an eLogbook will collect all information required by the U.S. government while at the same time be submitted to an infrastructure capable of increasing the throughput of logbook data as required by relevant Treaties and RMFOs.

Summary of potential commercial benefits to the fishing community of the research results:

Commercial benefits include increasing the capacity to track the harvesting of fish, which will lead to greater sustainability of fish populations and result in additional revenues and jobs for fishery participants and businesses that are reliant on this fishery (coastal ports and harbors, processors, etc.). All NPA commercial harvesters must maintain a record of catch, effort, and other information. This tool will ease the collection and submission burden of this data. It will also allow for more accurate data on catch and effort to inform decision making to maximize fishing opportunities for U.S. NPA fishery participants. The two RFMO have recently passed measures that could place harvest control rules through effort reduction if reference points, based on the recent management strategy evaluation, are breached. A lack of explicit and timely data could result in harvest control rules that negatively impact NPA fleet.

Additionally, increased data and data throughput would mean the NPA fleet would better meet its obligations under relevant treaties. This will lead to continued access to extended fishing grounds and Canadian ports, reducing operating costs. Finally, eLogbooks have the potential to collect important and valuable information above what is required by regulatory agencies, and certainly above the capability of current paper logbooks. Fields that could bolster the operations of small businesses, inform on environmentally sensitive topics, and inform industry groups and fishery researchers on the true value of the fishery, can be easily included for an individual, group, or the entirety of the NPA fleet, giving participants and stakeholders access to information not previously possible.
